



Sequence Listing 06-03.txt
SEQUENCE LISTING

<110> KOREA RESEARCH INSTITUTE OF BIOSCIENCE AND BIOTECHNOLOGY
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SOHN, Jung-Hoon
KIM, So-Young

<120> METHOD FOR SCREENING OF A LIPASE HAVING IMPROVED ENZYMATIC
ACTIVITY USING YEAST SURFACE DISPLAY VECTOR AND THE LIPASE

<130> 26666U

<140> 10/527,438
<141> 2005-03-11

<150> KR 2002-55575
<151> 2002-09-13

<160> 18

<170> PatentIn version 3.2

<210> 1
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> CALB primer 1

<400> 1
ggctcttcag ccactccttt ggtgaag 27

<210> 2
<211> 23
<212> DNA
<213> Artificial Sequence

<220>
<223> CALB primer 2

<400> 2
gcggatcctc agggggtgac gat 23

<210> 3
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> CALB primer 3

<400> 3
gcggatccgg ggggtgacgat gccggag 27

<210> 4
<211> 19
<212> DNA
<213> Artificial Sequence

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<220>
<223> GPD-err primer

<400> 4
gcagagctaa ccaataagg 19

<210> 5
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> T-O primer

<400> 5
tgcagttgaa cacaaccac 19

<210> 6
<211> 1023
<212> DNA
<213> Candida antarctica

<220>
<221> sig_peptide
<222> (1)..(51)
<223> secretion signal

<400> 6
atgaatatat ttacatatt ttgtttttg ctgtcattcg ttcaaggtac cgccactccc 60
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gatgcgggtc tgacctgcca ggggtgcttcg ccacctctcg tctccaaacc catccttctc 180
gtccccggaa ccggcaccac aggtccacag tcgttcgact cgaactggat cccctctctt 240
gcgcagctgg gttacacacc ctgctggatc tcacccccgc cgttcattgt caacgacacc 300
caggtcaaca cggagtacat ggtcaacgcc atcaccacgc tctacgctgg ttcgggcaac 360
aacaagcttc ccgtgctcac ctggtcccag ggtggtcttg ttgcacagtg gggctctgacc 420
ttcttcccca gtatcaggtc caaggtcgat cgacttatgg cttttgcgcc cgactacaag 480
ggcaccgtcc tcgccggccc tctcgatgca ctgcggttga gtgcaccctc cgtatggcag 540
caaaccaccg gttcggcact cactaccgca ctccgaaacg caggtggtct gaccagatc 600
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tcgccactcg actcatccta cctcttcaac gggaagaacg tccaggcaca ggctgtgtgt 720
gggccgctgt tcgtcatcga ccatgcaggc tcgctcacct cgcagttctc ctacgtcgtc 780
ggtcgatccg ccctgcgtc caccacgggc caggctcgta gtgcagacta tggcattacc 840
gactgcaacc ctcttccgc caatgatctg actcccagc aaaaggctgc cgcggctgcg 900
ctcccggcgc cggcggctgc agccatcgtg gcgggtccaa agcagaactg cgagcccgac 960

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ctcatgccct acgcccgcc ctttgtagta ggcaaaagga cctgctccgg catcgtcacc 1020
ccc 1023

<210> 7
<211> 1023
<212> DNA
<213> Candida antarctica

<220>
<221> sig_peptide
<222> (1)..(51)
<223> secretion signal

<400> 7
atgaatatat ttacatatt tttgtttttg ctgtcattcg ttcaaggtag cgccactcct 60
ttggtgaagc gtctgccttc cggttcggac cctgcctttt cgcagcccaa gtcggtgctc 120
gatgcgggtc tgacctgcca aggtgcttcg ccatcctcgg tctccaaacc catccttctc 180
gtccccggaa ccggcaccac aggtccacag tcgttcgact cgaactggat cccctctctc 240
gcgcagctgg gttacacacc ctgctggatc tcaccccgcg cgttcattgct caacgacacc 300
cagggtcaaca cggagtacat ggtcaacgcc atcaccacgc tctacgctgg ttcgggcaac 360
aacaagcttc ccgtgctcac ctggtcccag ggtggtcttg ttgcacagtg ggggtctgacc 420
ttcttcccca gtatcaggtc caaggctgat cgacttatgg cttttgcgcc cgactacaag 480
ggcaccgtcc tcgcccggcc tctcgtatga ctcgcgggta gtgcaccctc cgtatggcag 540
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tcgccactcg actcatccta ctttttcaac ggaaagaacg tccaggcaca ggctgtgtgt 720
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ctccggcgcg cggcggtgct agccatcgtg gcgggtccaa agcagaactg cgagcccgac 960
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ccc 1023

<210> 8
<211> 1023
<212> DNA
<213> Candida antarctica

<220>
<221> sig_peptide
<222> (1)..(51)

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<223> secretion signal

<400> 8

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atgaatatat ttacatatt ttgtttttg ctgtcattcg ttcaaggtac cgccactcct    60
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gatgcggggtc tgacctgcca gggtgcttcg ccattcctcg tctccaaacc catccttctc   180
gtccccggaa ccggcaccac aggtccacag tcgttcgact cgaactggat cccctctctt   240
gcgcagctgg gttacacacc ctgctggatc tcacccccgc cgttcattgct caacgacacc   300
caggtcaaca cggagtacat ggtcaacgcc atcaccacgc tctacgctgg ttcgggcaac   360
aacaagcttc ccgtgctcac ctgggtccag ggtggtctgg ttgcacagtg gggctctgacc   420
ttcttcccca gtatcaggtc caaggtcgat cgacttatgg cctttgcgcc cgactacaag   480
ggcaccgtcc tcgccggccc tctcgatgca ctgcgggtta gtgcaccctc cgtatggcag   540
caaaccaccg gttcggcact cactaccgca ctccgaaacg caggtggtct gaccagatc   600
gtgcccacca ccaacctcta ctcggcgacc gacgagatcg ttcagcctca ggtgtccaac   660
tcgccactcg actcatccta cctcttcaac ggaaagaacg tccaggcaca ggctgtgtgt   720
gggccgcagt tcgtcatcga ccatgcaggc tcgctcacct cgcagttctc ctacgtcgtc   780
ggtcgatccg ccctgcgctc caccacgggc caggctcgta gtgcagacta tggcattacg   840
gactgcaacc ctcttcccg ccaatgatctg actcccgagc aaaaggctgc cgcggctgcg   900
ctcctggcgc cggcggctgc agccatcgtg gcgggtccaa agcagaactg cgagcccgac   960
ctcatgccct acgcccggcc ctttgtagta ggcaaaagga cctgctccgg catcgtcacc  1020
ccc                                     1023

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<210> 9

<211> 341

<212> PRT

<213> Candida antarctica

<220>

<221> SIGNAL

<222> (1)..(17)

<223> secretion signal

<400> 9

Met Asn Ile Phe Tyr Ile Phe Leu Phe Leu Leu Ser Phe Val Gln Gly
1 5 10 15

Thr Ala Thr Pro Leu Val Lys Arg Leu Pro Ser Gly Ser Asp Pro Ala
20 25 30

Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
35 40 45

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Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
50 55 60

Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
65 70 75 80

Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
85 90 95

Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
100 105 110

Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
115 120 125

Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
130 135 140

Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
145 150 155 160

Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
165 170 175

Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
180 185 190

Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
195 200 205

Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
210 215 220

Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
225 230 235 240

Gly Pro Leu Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Ala Leu Pro Ala Pro

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290

295

300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
325 330 335

Gly Ile Val Thr Pro
340

<210> 10
<211> 341
<212> PRT
<213> Candida antarctica

<220>
<221> SIGNAL
<222> (1)..(17)
<223> secretion signal

<400> 10

Met Asn Ile Phe Tyr Ile Phe Leu Phe Leu Leu Ser Phe Val Gln Gly
1 5 10 15

Thr Ala Thr Pro Leu Val Lys Arg Leu Pro Ser Gly Ser Asp Pro Ala
20 25 30

Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
35 40 45

Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
50 55 60

Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
65 70 75 80

Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
85 90 95

Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
100 105 110

Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
115 120 125

Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
130 135 140

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Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
145 150 155 160

Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
165 170 175

Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
180 185 190

Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
195 200 205

Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
210 215 220

Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
225 230 235 240

Gly Pro Gln Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Ala Leu Pro Ala Pro
290 295 300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
325 330 335

Gly Ile Val Thr Pro
340

<210> 11
<211> 341
<212> PRT
<213> Candida antarctica

<220>
<221> SIGNAL
<222> (1)..(24)
<223> secretion signal

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<400> 11

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Met Asn Ile Phe Tyr Ile Phe Leu Phe Leu Leu Ser Phe Val Gln Gly
1      5      10
Thr Ala Thr Pro Leu Val Lys Arg Leu Pro Ser Gly Ser Asp Pro Ala
20      25      30
Phe Ser Gln Pro Lys Ser Val Leu Asp Ala Gly Leu Thr Cys Gln Gly
35      40      45
Ala Ser Pro Ser Ser Val Ser Lys Pro Ile Leu Leu Val Pro Gly Thr
50      55      60
Gly Thr Thr Gly Pro Gln Ser Phe Asp Ser Asn Trp Ile Pro Leu Ser
65      70      75      80
Ala Gln Leu Gly Tyr Thr Pro Cys Trp Ile Ser Pro Pro Pro Phe Met
85      90      95
Leu Asn Asp Thr Gln Val Asn Thr Glu Tyr Met Val Asn Ala Ile Thr
100     105     110
Thr Leu Tyr Ala Gly Ser Gly Asn Asn Lys Leu Pro Val Leu Thr Trp
115     120     125
Ser Gln Gly Gly Leu Val Ala Gln Trp Gly Leu Thr Phe Phe Pro Ser
130     135     140
Ile Arg Ser Lys Val Asp Arg Leu Met Ala Phe Ala Pro Asp Tyr Lys
145     150     155     160
Gly Thr Val Leu Ala Gly Pro Leu Asp Ala Leu Ala Val Ser Ala Pro
165     170     175
Ser Val Trp Gln Gln Thr Thr Gly Ser Ala Leu Thr Thr Ala Leu Arg
180     185     190
Asn Ala Gly Gly Leu Thr Gln Ile Val Pro Thr Thr Asn Leu Tyr Ser
195     200     205
Ala Thr Asp Glu Ile Val Gln Pro Gln Val Ser Asn Ser Pro Leu Asp
210     215     220
Ser Ser Tyr Leu Phe Asn Gly Lys Asn Val Gln Ala Gln Ala Val Cys
225     230     235     240

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Gly Pro Gln Phe Val Ile Asp His Ala Gly Ser Leu Thr Ser Gln Phe
245 250 255

Ser Tyr Val Val Gly Arg Ser Ala Leu Arg Ser Thr Thr Gly Gln Ala
260 265 270

Arg Ser Ala Asp Tyr Gly Ile Thr Asp Cys Asn Pro Leu Pro Ala Asn
275 280 285

Asp Leu Thr Pro Glu Gln Lys Val Ala Ala Ala Ala Leu Leu Ala Pro
290 295 300

Ala Ala Ala Ala Ile Val Ala Gly Pro Lys Gln Asn Cys Glu Pro Asp
305 310 315 320

Leu Met Pro Tyr Ala Arg Pro Phe Ala Val Gly Lys Arg Thr Cys Ser
325 330 335

Gly Ile Val Thr Pro
340

<210> 12
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> CALB primer 4

<400> 12
ctcatatgct accttccggt tcggac

26

<210> 13
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> a-amylase secretion signal

<400> 13

Met Met Val Ala Trp Trp Ser Leu Phe Leu Tyr Gly Leu Gln Val Ala
1 5 10 15

Ala Pro Ala Leu Ala
20

<210> 14
<211> 317
<212> PRT
<213> Candida antarctica

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<400> 14

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Leu Pro Ser Gly Ser Asp Pro Ala Phe Ser Gln Pro Lys Ser Val Leu
1      5      10      15

Asp Ala Gly Leu Thr Cys Gln Gly Ala Ser Pro Ser Ser Val Ser Lys
20     25     30

Pro Ile Leu Leu Val Pro Gly Thr Gly Thr Thr Gly Pro Gln Ser Phe
35     40     45

Asp Ser Asn Trp Ile Pro Leu Ser Ala Gln Leu Gly Tyr Thr Pro Cys
50     55     60

Trp Ile Ser Pro Pro Pro Phe Met Leu Asn Asp Thr Gln Val Asn Thr
65     70     75     80

Glu Tyr Met Val Asn Ala Ile Thr Thr Leu Tyr Ala Gly Ser Gly Asn
85     90     95

Asn Lys Leu Pro Val Leu Thr Trp Ser Gln Gly Gly Leu Val Ala Gln
100    105    110

Trp Gly Leu Thr Phe Phe Pro Ser Ile Arg Ser Lys Val Asp Arg Leu
115    120    125

Met Ala Phe Ala Pro Asp Tyr Lys Gly Thr Val Leu Ala Gly Pro Leu
130    135    140

Asp Ala Leu Ala Val Ser Ala Pro Ser Val Trp Gln Gln Thr Thr Gly
145    150    155    160

Ser Ala Leu Thr Thr Ala Leu Arg Asn Ala Gly Gly Leu Thr Gln Ile
165    170    175

Val Pro Thr Thr Asn Leu Tyr Ser Ala Thr Asp Glu Ile Val Gln Pro
180    185    190

Gln Val Ser Asn Ser Pro Leu Asp Ser Ser Tyr Leu Phe Asn Gly Lys
195    200    205

Asn Val Gln Ala Gln Ala Val Cys Gly Pro Leu Phe Val Ile Asp His
210    215    220

Ala Gly Ser Leu Thr Ser Gln Phe Ser Tyr Val Val Gly Arg Ser Ala
225    230    235    240

Leu Arg Ser Thr Thr Gly Gln Ala Arg Ser Ala Asp Tyr Gly Ile Thr

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245

250

255

Asp Cys Asn Pro Leu Pro Ala Asn Asp Leu Thr Pro Glu Gln Lys Val
260 265 270

Ala Ala Ala Ala Leu Leu Ala Pro Ala Ala Ala Ala Ile Val Ala Gly
275 280 285

Pro Lys Gln Asn Cys Glu Pro Asp Leu Met Pro Tyr Ala Arg Pro Phe
290 295 300

Ala Val Gly Lys Arg Thr Cys Ser Gly Ile Val Thr Pro
305 310 315

<210> 15
<211> 28
<212> DNA
<213> Artificial Sequence

<220>
<223> LQ53 primer

<400> 15
gctgtgtgtg ggccgcagtt cgtcatcg

28

<210> 16
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> LQ35 primer

<400> 16
gcatggtcga tgacgaactg cgccccacac

30

<210> 17
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> LP53 primer

<400> 17
gtcgccgcgg ctgcgctccc ggcgccggcg

30

<210> 18
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> LP35 primer

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<400> 18

ctgcagccgc cggcgccggg agcgagcc

29